Paper No. 17

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

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Ex parte Jun Cai, Guang Ping Hua, Jun Song,
and
Keng Foo Lo

_____

Appeal No. 2002-2087
Application No. 09/733,836

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ON BRIEF

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Before OWENS, WALTZ, and PAWLIKOWSKI, Administrative Patent Judges.
WALTZ, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on an appeal from the primary examiner's final rejection of claims 9 through 16. Claims 1-8, which are the only other claims pending in this application, stand withdrawn from consideration by the examiner as drawn to a non-elected invention (Brief, page 1). We have jurisdiction pursuant to 35 U.S.C. § 134.

According to appellants, the invention is directed to a transistor structure for electrostatic discharge (ESD) protection in an integrated circuit device where the semiconductor substrate

has source and drain diffusion regions over respective source and drain wells, with a shallow trench isolation (STI) formed over and into the substrate to separate the source and drain diffusion regions and a portion of the source and drain wells, and source and drain contact structures formed on and extending through the STI to contact the source and drain diffusion regions (Brief, page 2). Representative independent claim 9 is reproduced below:

9. An electrostatic discharge protection structure comprising:

a semiconductor substrate, the semiconductor substrate having source and drain diffusion regions, the semiconductor substrate having respective source and drain wells under the source and drain diffusion regions;

a shallow trench isolation formed over the semiconductor substrate and into the semiconductor substrate to separate the source and drain diffusion regions and a portion of the source and drain wells; and

source and drain contact structures respectively formed on the shallow trench isolation over the source and drain diffusion regions and extending through the shallow trench isolation to contact the source and drain diffusion regions.

The examiner relies upon the following references as evidence of obviousness:

Williams et al. (Williams)	5,545,909	Aug. 13, 1996
Lin et al. (Lin) (filed Jan. 21, 2000)	6,218,226 B1	Apr. 17, 2001

Claims 9-16 stand rejected under 35 U.S.C. § 112, first paragraph, "as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention." Answer, page 3.

Claims 9-16 stand rejected under 35 U.S.C. § 112, second paragraph, as being indefinite (Answer, page 4). Claims 9-16 also stand rejected under 35 U.S.C. § 103(a) as unpatentable over Lin in view of Williams (Answer, page 5).[1]

We *reverse* all of the examiner's rejections on appeal essentially for the reasons stated in the Brief and Reply Brief, and those reasons set forth below.

OPINION

A. The Rejections under 35 U.S.C. § 112, ¶1 and ¶2

The examiner finds that claims 9 and 13 recite source and drain contact structures extending through the shallow trench isolation (STI)(Answer, sentence bridging pages 3-4). The examiner states that it is "well known" in the art that STI is "defined" as a shallow trench formed inside and below the substrate to isolate

[1]The final rejection of claims 9-16 under 35 U.S.C. § 103(a) over Williams alone or in view of Lin has been withdrawn by the examiner (Answer, page 2; Reply Brief, page 7).

active regions of the semiconductor device, and a trench "by definition" can not be formed on the surface of the substrate (Answer, page 4). Since the examiner finds that the source and drain contact structures are not formed below the substrate surface, the examiner determines that there is no support for source and drain contact structures extending through the STI (*id.*).

Accordingly, the examiner also finds that the claims are indefinite under paragraph two of section 112 since it is "unclear as to how a trench can be formed over the substrate" (Answer, page 4).

Although the examiner appears to confuse the requirements of section 112 for written description, enablement, and definiteness,[2] the initial burden of establishing unpatentability on any ground rests with the examiner. *See In re Oetiker,* 977 F.2d 1443, 1445, 24 USPQ2d 1443, 1444 (Fed. Cir. 1992). Under the written description requirement of the first paragraph of section 112, the examiner must establish that the originally filed disclosure would not have reasonably conveyed to one of ordinary skill in this art

[2]*See Vas-Cath Inc. v. Mahurkar,* 935 F.2d 1555, 1563, 19 USPQ2d 1111, 1117 (Fed. Cir. 1991); *and In re Angstadt,* 537 F.2d 498, 501, 190 USPQ 214, 217 (CCPA 1976).

that appellants had possession of the now claimed subject matter. *See In re Edwards,* 568 F.2d 1349, 1351-52, 196 USPQ 465, 467 (CCPA 1978). "The legal standard for definiteness [under section 112, ¶2] is whether a claim reasonably apprises those of skill in the art of its scope. [Citations omitted]." *In re Warmerdam,* 33 F.3d 1354, 1361, 31 USPQ2d 1754, 1759 (Fed. Cir. 1994).

We determine that the examiner has not met this initial burden for either rejection under the first or second paragraphs of section 112. Regarding the examiner's rejection under the second paragraph, the specification and drawing clearly shows how a trench can be formed over and into a substrate (specification, page 5, ll. 29-30, and Figure 1). The examiner has failed to establish that a trench cannot be "by definition" formed on the surface of the substrate, with no evidence of any "definition" on this record. As correctly argued by appellants (Reply Brief, pages 5-6), the applied prior art in this appeal establishes that STIs can be formed over the substrate. With regard to the rejection under the first paragraph of section 112, the examiner's statement that there is no support for source and drain contact structures extending through the STI "as recited in claims 9 and 13" is incorrect (Answer, page 4). Claim 9 on appeal recites that the source and drain contact structures are formed <u>on</u> the STI and extend through

the STI to contact the source and drain diffusion regions (and thus these contact structures do not extend through the entire STI). Support for this recitation in claim 9 is clearly found in the specification (page 6, ll. 1-3) and Figure 1.

For the foregoing reasons and those stated in the Brief and Reply Brief, we determine that the examiner has failed to meet the initial burden of establishing failure to meet the requirements of 35 U.S.C. § 112, first and second paragraphs. Accordingly, we reverse the rejections of claims 9-16 under ¶1 and ¶2 of 35 U.S.C. § 112.

B. The Rejection under 35 U.S.C. § 103(a)

The examiner finds that Lin teaches, in Figure 6 and related text, an ESD structure comprising a p type semiconductor substrate 20 [sic, 10; see Lin, col. 3, l. 30], n+ source and drain diffusion regions 43, and respective source and drain n-wells 21, under each diffusion region, and STI 30 formed over and into the substrate "to separate the source and drain diffusion regions and a portion of the source and drain wells" (Answer, page 5). The examiner admits that Lin does not explicitly state that STI regions separate the source and drain diffusion regions and a portion of the source and drain wells, but the examiner states that "it is well known in the art that STI regions separate active regions of one device from

active regions of adjacent devices on the substrate." *Id.* The examiner finds that Lin teaches that the STI regions separate each active region (*id.*, citing col. 3, ll. 32-33). Therefore the examiner finds that the STI regions of Lin separate the source and drain diffusion regions and a portion of the source and drain wells of device 40 from other devices or from other active regions on the substrate. (Answer, pages 5 and 10).

The examiner recognizes that Lin does not teach forming source and drain contact structures on the isolation regions over the source and drain diffusion regions and extending these contact structures through the STI to contact the source and drain diffusion regions (Answer, page 5). Accordingly, the examiner applies Williams for the teaching of source and drain contact structures formed on the isolation regions and extending through these regions to contact the source and drain diffusion regions (Answer, page 6, citing Figure 14). From these findings, the examiner concludes that it would have been obvious, as taught by Williams, to form source and drain contact structures on the isolation regions to contact the source and drain diffusion regions in the Lin device "in order to activate the device by providing external connections to the source and drain regions." *Id.* The examiner notes that the Lin device as depicted in Figure 6 is not a

"final structure" and cannot operate without source and/or drain contact structures over the active regions (*id.*).

We agree with the examiner's claim construction, namely that claim 9 on appeal does not require that the STI separates the source and drain diffusion regions of the *same* device (Answer, page 10). The claimed language must be construed as broadly as reasonably possible when read in light of the specification as it would have been understood by one of ordinary skill in this art. *See In re Morris*, 127 F.3d 1048, 1054, 44 USPQ2d 1023, 1027 (Fed. Cir. 1997). However, even in light of this claim construction, the examiner has not established, by convincing evidence or reasoning, that Lin discloses, teaches or suggests a STI that separates "a portion of the source and drain wells" (see claim 9). Therefore we determine that the examiner's finding is not supported by an adequate factual basis.

When relying on numerous references or a modification of the prior art to establish a *prima facie* case of obviousness, it is incumbent on the examiner to identify some motivation, suggestion or reason from the prior art or knowledge in the art that the references would have been combined. *See In re Mayne*, 104 F.3d 1339, 1342, 41 USPQ2d 1451, 1454 (Fed. Cir. 1997). We determine that the examiner has not established a convincing reason or

motivation to support the proposed combination of Lin and Williams (see the Brief, pages 15-16; Reply Brief, pages 9-10). The examiner states that the motivation or reason for combination is "in order to activate the [Lin] device by providing external connections to the source and drain regions." Answer, page 6. However, the examiner has not established that this motivation or reason was disclosed or suggested by either Lin or Williams, known to one of ordinary skill in this art, or would have been evident from the nature of the problem to be solved. *See Pro-Mold & Tool Co. v. Great Lakes Plastics, Inc.*, 75 F.3d 1568, 1573, 37 USPQ2d 1626, 1629 (Fed. Cir. 1996). The examiner's statement that the device of Lin as shown in Figure 6 "is not a final structure" is only a mere assertion that the examiner has not supported by any evidence or convincing reasoning.

For the foregoing reasons and those stated in the Brief and Reply Brief, we determine that the examiner has failed to establish a *prima facie* case of obviousness in view of the reference evidence. Accordingly, we cannot sustain the rejection of the claims on appeal based on 35 U.S.C. § 103(a) over Lin in view of Williams.

C. Summary

The rejection of claims 9-16 under 35 U.S.C. § 112, first paragraph, is reversed. The rejection of claims 9-16 under 35 U.S.C. § 112, second paragraph, is reversed.

The rejection of claims 9-16 under 35 U.S.C. § 103(a) over Lin in view of Williams is reversed.

The decision of the examiner is reversed.

REVERSED

TERRY J. OWENS Administrative Patent Judge	)	
THOMAS A. WALTZ Administrative Patent Judge	)	BOARD OF PATENT APPEALS AND INTERFERENCES
BEVERLY A. PAWLIKOWSKI Administrative Patent Judge	)	

TAW/jrg

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